

Mix quick, use and make sure the environment is pure - A cross sectional survey on Dental material wastage among dental students in Chennai, India.

Abstract

Background: There are number of hazardous dental waste that when disposed of improperly could cause harm to our health and environment. To prevent the harmful effect on health and the environment it is required in dentistry to follow proper segregation protocol.

Objective: The purpose of the study is to assess the knowledge, attitude and practices about dental material waste management among dental undergraduate and postgraduate students.

Methodology: A cross-sectional questionnaire-based study was conducted among 405 students at a private dental educational institution in Chennai. The questionnaire comprised of a few socio-demographic factors and 16 closed-ended questions about knowledge, attitude and practice of dental material waste management. Chi square and SPSS software for Windows, version 20.0(SPSS Inc., Chicago, IL, USA) were used to analyze the data collected.

Results: 88% of the students were aware of dental waste management. Chi-square shows the association between the price of the material used and the factor leading to wastage was found be significant with a p value < 0.05.

Conclusion: The present study concluded that the price of the material has an effect on the factor that leads to wastage, and majority of the subjects were aware of dental waste management. Despite there should be desired attention is needed regarding the proper disposal of dental waste to safeguard the environment from pollution and to ensure the best standards of dentistry.

Key words: Dental students, wastage, dental cements, impression materials.

INTRODUCTION:

Health care is an essential aspect of life; these health care activities generate a large amount of waste called biomedical waste [1]. The amount of biomedical waste generated per day is increasing more and more with the increase in healthcare facilities. In many developing countries disposal of solid waste was not considered a serious issue, they dispose both solid and hazardous waste with domestic waste, thus making a serious health risk to professionals as well as public [2]. Being professionals' dentist should know the proper disposal of solid waste and also dental material waste and their recycling processes which consecutively helps to minimize health risk and pollution free environment[3]. In July 1998, the first biomedical waste management rules were notified by Government of India, by the erstwhile Ministry of Environment and Forest [4].

Dental waste is grouped under biomedical waste; Dental clinics/institutions are a multidisciplinary system, which provides essential care for patients who need dental care [5]. The dentists and other healthcare workers commonly spend their maximum time in clinics and institutions with patients. Improper disposal of dental material waste could not only harm the health of dentist and patient but also the environment. A study conducted by Abhishek et al in 2016 who found significant association between qualification of the study participants and their knowledge on practice of dental waste management[6].

So, the dentist and other health care workers needs to be well equipped with the latest information, skills and practices in managing these wastes, thus reduces hospital-acquired-infections which protect health and environment. Since undergraduate dental students are the budding dentists of the future, they need to be aware of dental waste and its management. Hence, an attempt is made in this study to assess the knowledge, attitude and practices towards dental material waste and its management among the students in a private dental institution.

METHODOLOGY:

A single institutional cross-sectional study was conducted to assess the knowledge, attitude, and practices of dental material waste management among 405 students studying at private dental institution, Chennai. This study was conducted for a period of 2 months from October 2017 to November 2017 and was approved by institutional review board public health dentistry SRM dental college, Chennai. A self-administered questionnaire was distributed to the undergraduate and postgraduate students in the institution to assess their knowledge, attitude, and practices towards dental material waste management.

The questionnaire comprised of 16 items on the awareness of dental waste management, common dental waste, training on dental waste management, factors leading to wastage, storage method for excess amalgam, disposal of gypsum and impression material waste, awareness of price of the dental material, awareness of expiry date of dental

material, regulations to stop wastage in college, prevention of dental material wastage, whether the price of the dental material influenced the wastage, whether material wastage was discouraged by the institution. Among those one was mainly to assess the wastage and usage of 6 most common dental materials. The participants were asked to rank the least used to the most used and the least wasted to the most wasted dental material according to their perception. In addition to this, demographic data such as name, gender, level of education of the participant (undergraduate or postgraduate), year of study, address was captured in the questionnaire. The participants were selected by simple random sampling. A total of 467 participants agreed to participate in the study and signed informed consent forms. But only 405 subjects out of 467 have completed responses for the questionnaire and were considered in the final analysis, hence 405 is the total study population. First year undergraduate students were

excluded from the study since they were new to the clinical aspects. Respondents absent due to illness or other personal reasons on the day of data collection, subjects who did not give consent and subjects with incomplete responses were excluded in the study. Chi square and SPSS software for Windows, version 20.0 (SPSS Inc., Chicago, IL, USA) were used to analyze the data collected.

RESULTS

Table: 1 shows that 405 subjects participated in the study. Out of the 405 subjects, 291 were undergraduate and 114 were postgraduate dental students. Among the undergraduates, 21 (80.77%) were from second year, 96 (96.97%) were from third year, 96 (96%) were from fourth year and 78 (78%) were interns. The post graduates were 114 (80.2%) in number.

[TABLE- 1]: SAMPLE DISTRIBUTION AND RESPONSE RATE

Level of Study	Total Distributed(n)	Total Received(n)	Response Rate (%)
Under Graduates -II	26	21	80.7%
Under Graduates-III	99	96	96.97%
Under Graduates-IV	100	96	96%
Interns	100	78	78%
Post Graduates	142	114	80.2%
TOTAL	467	405	86.7%

[TABLE 2]: PERCENTAGE DISTRIBUTION BASED ON AWARENESS ABOUT DENTAL MATERIAL WASTE MANAGEMENT.

S No	Questions	YES (%)	NO (%)
1	Are you aware of the Dental waste Management?	88.1	11.9
2	Have you received any training on Dental waste Management?	81.0	19.0
3	Are you aware about the price of the materials you use?	67.1	32.9
4	Do you think the price of the material is in concerned to the wastage?	69.4	30.6
5	Do you agree that the wastage of dental materials should not be encouraged?	80.7	19.3
6	Are you aware about any legislation, regulations or rules in our college to stop wastage?	51.4	48.6
7	Are you aware about the expiry date of the materials you use?	52.1	47.9

[TABLE- 3]: PERCENTAGE DISTRIBUTION BASED ON WASTAGE OF DENTAL MATERIALS

Common dental materials waste	56.5% - Dental Stone & Plaster 27.4% - Impression Material 10.1% - Dental Cements 5.9% - Cotton, Gloves, Mask.
Cause for wastage of materials	32.6% - Lack of more accurate methods of measuring the amount of materials required for a procedure 32.4% - No strict rules and regulations 23% - Poor training in wastage management 12.1% - Lack of understanding about the properties of materials
Factors leading to wastage	52.8% - Mixing more amount than required 21% - Carelessness among students 14% - Not aware of accurate ratio 11% - Leaving open after use
Storage of excess Silver amalgam	43.2% - Fixer 29.6% - Dispose in bin 19% - Recycle
Gypsum waste disposal	69.1% - Bin 14% - Landfills in separate area 11.9% - Don't know
Impression material disposal	79.0% - Bin 7.9% - Landfills in separate area 3% - Leave it at the workplace 9.9% - Don't know

[TABLE- 4]: ASSOCIATIONS BETWEEN AWARENESS ABOUT THE PRICE OF THE MATERIAL USED AND FACTORS LEADING TO WASTAGE

AWARENESS ABOUT THE PRICE OF THE MATERIAL USED	FACTORS LEADING TO WASTAGE				TOTAL	P VALUE
	Mixing more amount than needed	Leaving the material container open after use	Don't know the accurate ratio of mixture	Carelessness of the student		
YES(n)	155	28	43	48	274	0.032
NO(n)	59	17	17	38	131	
TOTAL(n)	214	45	60	86	405	

Table: 2 shows that the majority of the students, 328 (81.0%), had undergone training in dental material waste management. 274 (67.7%) of the students reported that they were aware about the price of the materials they use daily. 88.1% of the students are aware of dental waste management. Only 51.4% of the students were aware of legislations placed to stop wastage by reading them from posters and notices in the laboratory and college campus. Table: 3 shows 229 (56.5%) of the students agreeing that common dental material waste is Dental stone & Plaster of Paris. 132 (32.6%) of the students indicating the cause for wastage of dental materials was lack of more accurate methods of measuring the amount of materials required for

a procedure. 214 (52.8%) of the students indicated the factor that lead to wastage of dental materials was mixing more amount than required. Majority of the students 175 (43.2%) reported that they will store the excess amalgam in Fixer.

Table 4 shows Chi square test were used for association between awareness about the price of the material used and factors leading to wastage, the p value was found to be 0.032 (significant) at an alpha level of 0.05.

Figure: 1 shows that the more commonly used Dental Cement was Silver amalgam 106 (26.2%) and Zinc oxide eugenol was the least used 33 (8.1%) by dental students.

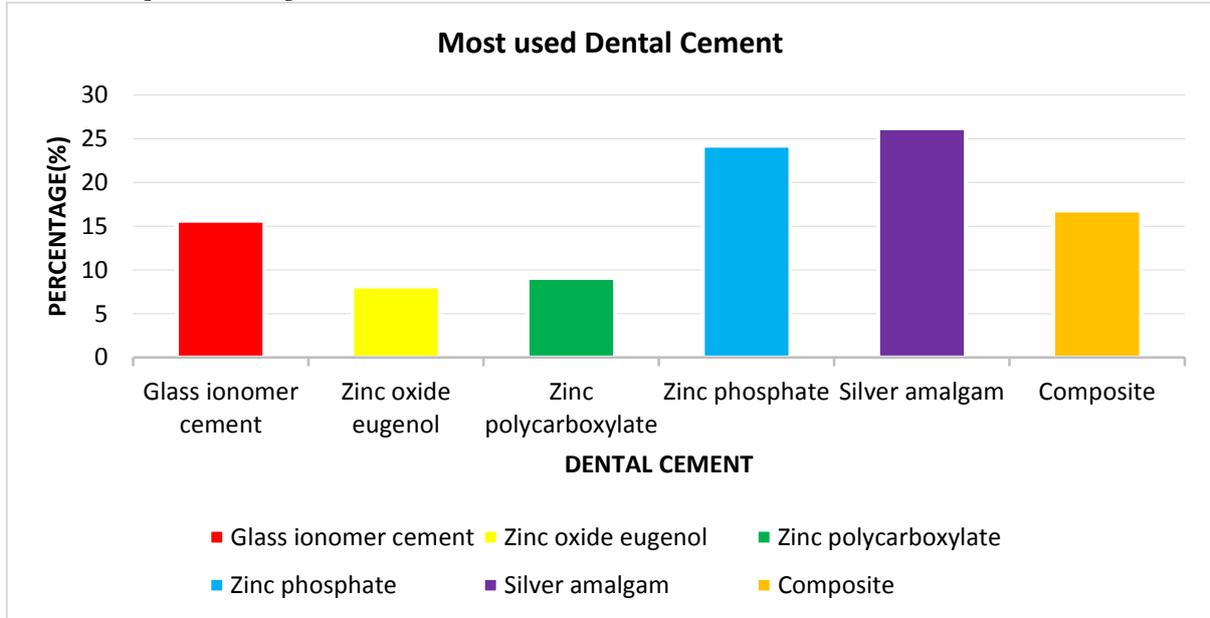
Figure: 2 shows that the more commonly wasted Dental Cement was Silver amalgam with 133 (32.8%) and Composite was the least wasted with 18 (4.4%) among the dental students.

Figure: 3 shows that the more commonly used Impression material was Alginate with 199 (49.1%) and Impression

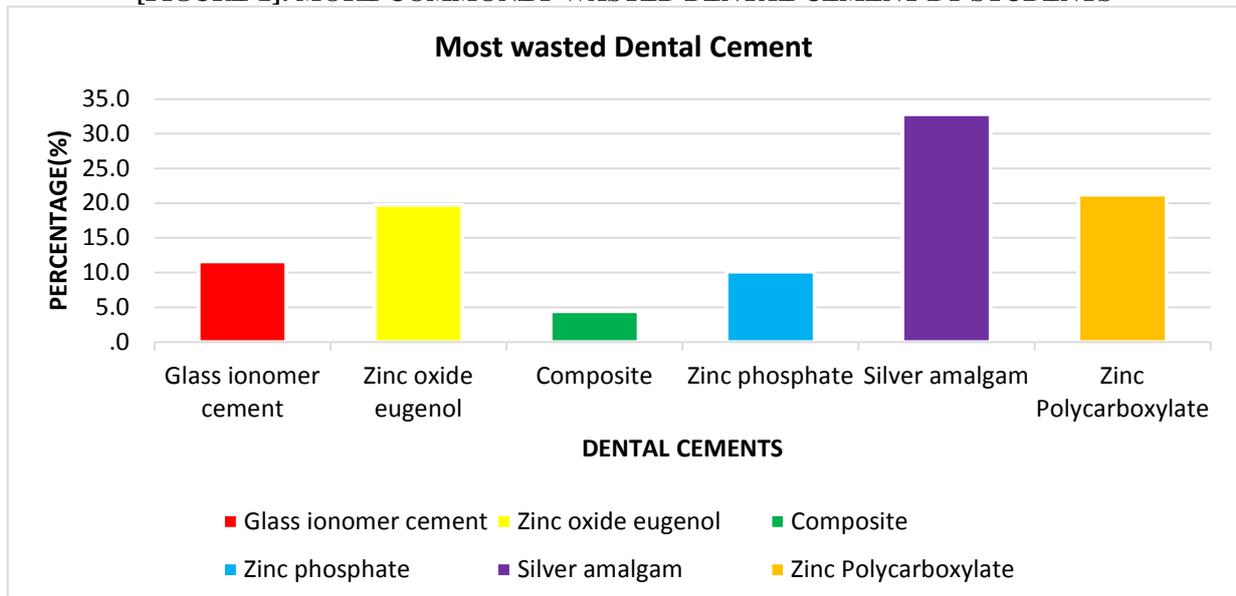
Compound was the least used with 12 (3.0%) among the dental students.

Figure: 4 shows that the more commonly wasted impression material was Alginate with 124 (30.6%) and Impression compound was the least wasted with 21 (5.2%) by the dental students

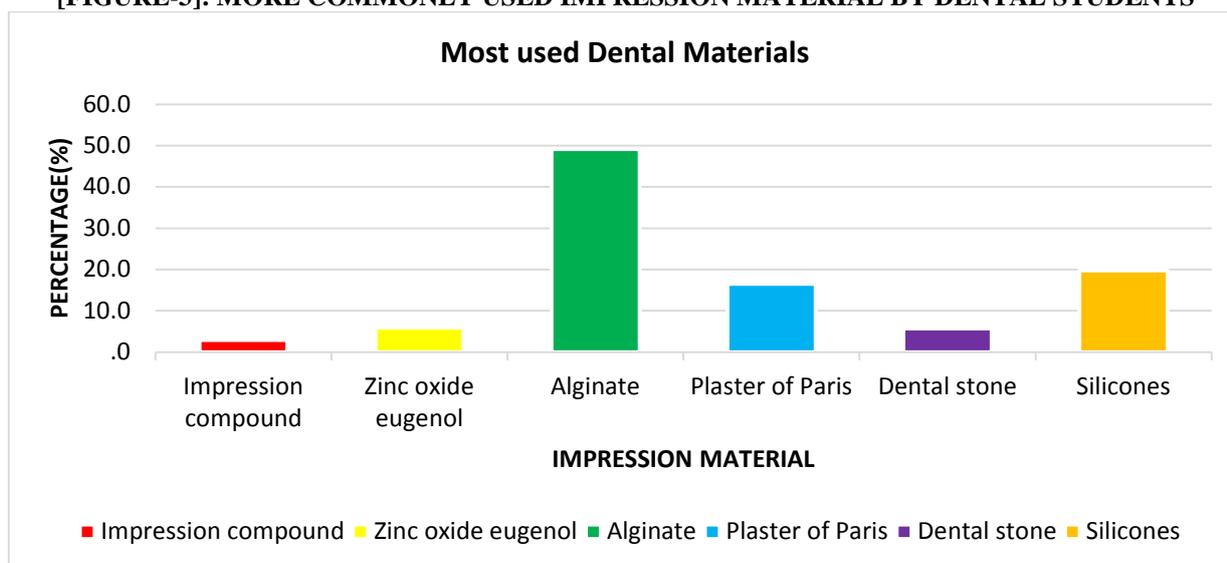
[FIGURE- 1]: MORE COMMONLY USED DENTAL CEMENT BY STUDENTS



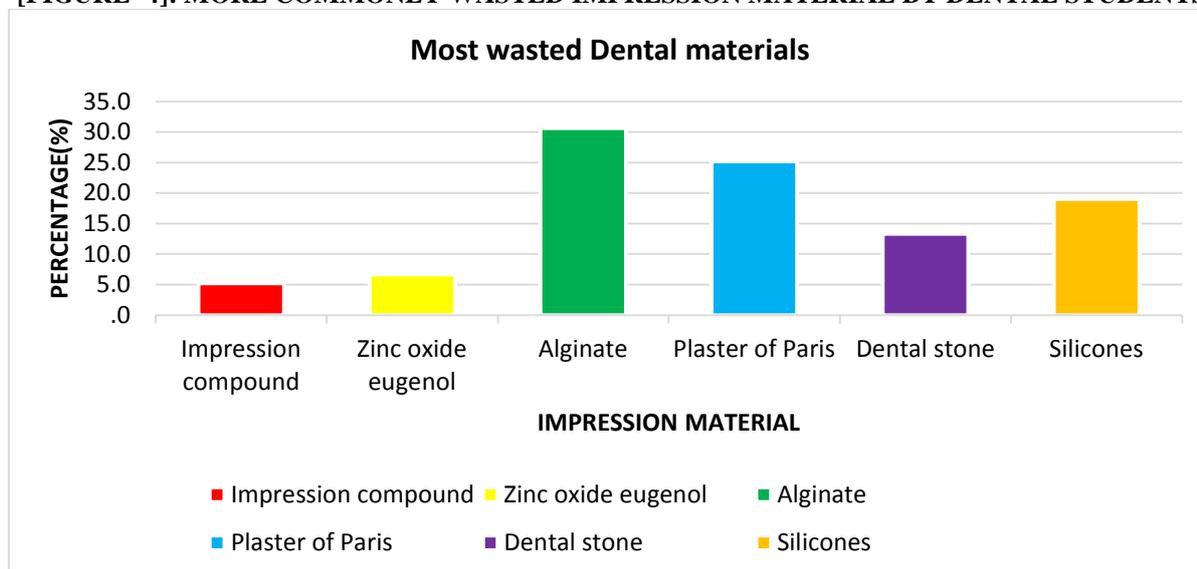
[FIGURE-2]: MORE COMMONLY WASTED DENTAL CEMENT BY STUDENTS



[FIGURE-3]: MORE COMMONLY USED IMPRESSION MATERIAL BY DENTAL STUDENTS



[FIGURE- 4]: MORE COMMONLY WASTED IMPRESSION MATERIAL BY DENTAL STUDENTS



DISCUSSION:

According to the WHO, 80 to 85% of hospital waste consists non-hazardous and 15 to 20% consists hazardous. Among the hazardous waste 10% are infectious and 5% are non-infectious waste [7]. Rapid urbanization and population growth has led to a greater number of hospitals and private clinics. A serious situation may arise in future, due to the toxicity and unavailability of dumping grounds for such wastes. Many studies from developing countries have been documented in the literature, showing inadequacy of knowledge and indigent attitude among health care workers regarding biomedical waste. These studies were mainly focused on biomedical waste management, but did not discuss about dental material waste management in particular. So, the present study was a small effort to assess the knowledge, attitude and the practice of dental students towards dental material wastage and its management.

In the present study, 31.6% of the study subject reported that more commonly wasted impression material was Alginate. This is in accordance with the study conducted by Dolphine et al in 2013 who found that 30.6% of the subjects were reported that alginate was more commonly wasted impression material [8].

In the present study only 51.4% of the study subjects reported that they were aware of the legislation, rules and regulations in the college to avoid wastage of dental materials, which is similar to the study conducted by Ranjan et al., in 2016 who found that 55.3% were aware of the rules and regulations in their college to avoid wastage of dental materials [3].

Dental Amalgam plays an important role in dentistry. American Dental Association recommends the best management practice for amalgam waste by recycling them as much as possible. In this study the most commonly used dental cement was Silver amalgam with

26.2%, and the most wasted material was also Silver amalgam with 32.8% among the dental students. This might be because of Silver amalgam filling being the most preferred filling due to its high strength. Though the students have adequate knowledge and awareness about Silver Amalgam, there is a significant wastage of the material by them. Silver Amalgam not having any accurate ratio for manual mixing could be the reason and hence it usually ends up in excess mixing and followed by wastage. The accidental mercury spills are usually common in dental practice; where <10 grams of mercury spill is considered small and more than that is large [9, 10]. The American Dental Association recommends that excess amalgam should be stored in fixer [11]. In this study, only 43.2% of study subject reported that they store the excess amalgam in a fixer. This is in accordance with the study conducted by Ashikab Riswana in Chennai where it was reported to be 49.3% [12].

Majority of the students in this study (88.1%) were aware of dental material waste management, despite there was more wastage, the main reason for dental material wastage reported by the students was lack of knowledge about the required amount of dental materials to be used for dental procedure.

The limitation in the present study is that the subjects were taken from a single educational institution, and therefore it is not representative of dental students on the whole. It is about the awareness on dental waste management among only a part of dental students.

CONCLUSION:

With increasing number of hospitals and dental colleges, improper disposal of biomedical materials can lead to significant environmental and health related hazards. Thus, adequate knowledge about this issue is essential. This study shows that there persists a lack of sufficient knowledge among dental students pertaining to dental waste management. Hence, simultaneous training prioritized to dental waste management is required as part of training courses which can be more interactive and demonstrative. Thus resulting in more awareness of waste

management, health risk and pollution free environment among professional students and health care workers in future.

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